

205

Begin

REEL  
542  
SOTSKAYA, K.H.N.

SOURCE CODE: UR/0428/66/000/003/0107/0119

AUTHOR: Sotskaya, Kh. N.; Fedorov, F. I.

ORG: none

TITLE: Singular points of the cross section curves of the surfaces of elastic waves in crystals

SOURCE: AN BSSR. Vestsi. Seryya fizika-matematichnykh navuk, no. 3, 1966, 107-116

TOPIC TAGS: elastic wave, elastic modulus, crystal lattice structure, crystal symmetry

ABSTRACT: The authors obtain equations for the sections of the wave surfaces by the symmetry planes for rhombic, hexagonal, tetragonal, and cubic crystals in a parametric form, and for arbitrary crystals in an implicit form, and investigate the singular points of these sections. All the calculations are based on the fact that the sections of purely transverse waves by the symmetry planes are ellipses, and the equations for the different symmetries are obtained by substituting the proper moduli of elasticity and other constants. The investigation of the singular points, which has not been carried out by anyone before, is based on eliminating the angle variable from the parametric equations by means of a coordinate transformation. It is shown, in agreement with earlier results by one of the authors (Fedorov, Teoriya uprugikh voln v kristallakh [Theory of Elastic Waves in Crystals], Nauka, M. 1965) that the equation for the section of the wave surface by the symmetry plane in any crystal has

Cord 1/2

ACC NR: AP6033062

a degree not higher than twelve. The positions of the turning points and other singular points are determined, with particular attention to the plane perpendicular to the fourfold axis, and the conditions under which the singular point is a turning point are established. Orig. art. has: 55 formulas.

SUB CODE: 20/ SUBM DATE: 10May66/ ORIG REF: 007/ OTH REF: 001

Card 2/2

SOTSKAYA, M.N.

Nesting of penduline tit in southern Moscow Province. Ornitologiya  
no.7:488 '65.

(MIRA 18:10)

SOTSKAYA, V.P.; SMIRNOV, V.A.

Chemical changes of starch due to cooking in the distilling industry.  
Izv. vys. ucheb. zav.; pishch. tekhn. no.4:25-34 '61. (MIRA 14:8)

1. Leningradskiy tekhnologicheskii institut pishchevoy promyshlennosti,  
kafedra tekhnologii spirta.  
(Starch) (Distillation)

SOTSKAYA, V.P.; SMIRNOV, V.A.

Effect of the pH during the thermal processing of grains on the losses of fermented carbohydrates and the yield of alcohol. Izv. vys. ucheb. zav.; pishch. tekhn. no.2:93-98 '63.

(MIRA 16:5)

1. Leningradskiy mezhotraslevoy nauchno-issledovatel'skiy institut pishchevoy promyshlennosti, laboratoriya tekhnologii spirta.

(Distillation)

SOTSKAYA, V.P.; SMIRNOV, V.A.; TIKHOMIROVA, L.Ya.

Effect of pH on alcohol yield in the thermal treatment of  
crushed raw materials. Izv. vys. ucheb. zav.; pishch. tekhn.  
no.6:67-69 '63. (MIRA 17:3)

1. Leningradskiy mezhotraslevoy nauchno-issledovatel'skiy  
institut pishchevoy promyshlennosti, laboratoriya tekhnologii  
spirta.



LETCHNYA, L.A.

28627

I Koslova. V. L. Sanatsiya Skarlatinoznykhi Diftyeriyykh Nosityelyey. Vrachyeb  
Cyelo, 1949, No 9 STB 817-20  
Khirurgiya Ortopyediya

SC: LETOPIS NC. 38

SOTSKAYA, Z. A.

SOTSKAYA, Z. A.: "The stimulating effect of cold on certain functions of microbes producing antibiotics." Odessa State Medical Institute imeni N. I. Pirogov. Odessa, 1956. (Dissertation for the Degree of Doctor in Medical Sciences.)

Source: Knizhnaya letopis' No 40 1956 Moscow

SOTSKAYA, Z.A., Doc Med Sci -- (diss) "Concerning the  
stimulating <sup>effect</sup> ~~action~~ of cold <sup>up</sup> on certain functions of  
microbes <sup>and</sup> ~~producing~~ of antibiotics." Khar'kov,  
1958, 16 pp. (Khar'kov State Med Inst) 230 copies  
(KL, 39-58, 111)

- 59 -

GROMOV, A.S., prof., doktor med.nauk, otv.red.; ~~BOITSKAYA~~, Z.A., dotsent, red.; GORITSKAYA, V.V., dotsent, red.; KARAKASH, R.I., nauchnyy sotrudnik, red.; BADAYEV, D.A., tekhn.red.

[Problems in the immunology, microbiology, and epidemiology of intestinal infections] Voprosy immunologii, mikrobiologii i epidemiologii kishhechnykh infektsii. Dnepropetrovsk, 1959. 256 p. (MIRA 14:2)

1. Dnepropetrovskiy nauchno-issledovatel'skiy institut epidemiologii, mikrobiologii i gigiyeny im. N.F.Gamaleya. 2. Direktor Dnepropetrovskogo nauchno-issledovatel'skogo instituta epidemiologii, mikrobiologii i gigiyeny im. N.F.Gamaleya (for Gromov). (INTESTINES--DISEASES)

GORGIYEV, T.B.; SOTSKAYA, Z.A.

Microbe forms resistant to antibiotics. Vrach. delo no. 3:125 Mr '61.  
(MIRA 14:4)

1. Dnepropetrovskiy institut epidemiologii, mikrobiologii i  
gigiyeny.

(STAPHYLOCOCCUS) (ANTIBIOTICS)

NIKOLAYENKO, S.S., inzh.; YES'KOV, A.S., inzh.; SOTSKIY, A.R., inzh.;  
MAKSIMCHUK, A.A., inzh.; VESELOV, Yu.A., inzh.

Deepening the shaft of the Komintern Mine. Shakht. stroi.  
6 no.7:20-24 JI '62. (MIRA 15:7)

1. Shakhtoprokhodcheskoye upravleniye No.2 tresta Krivobasssshakhtoprokhodka (for Nikolayenko). 2. Krivorozhskiy filial  
Ukrainskogo nauchno-issledovatel'skogo instituta organizatsii  
i mekhanizatsii shakhtnogo stroitel'stva (for Yes'kov, Sotskiy,  
Maksimchuk, Veselov).

(Krivoy Rog Basin--Shaft sinking)

YES'KOV, Anatoliy Semenovich; MAKSIMCHUK, Aleksey Arssent'yevich;  
KAZAKEVICH, Eduard Veniaminovich; SOTSKIY, Ananly  
Rodionovich; TREGUBOV, Vitaliy Anatol'yevich; SORIN,  
Mikhail Samoylovich; FEDOROV, S.A., prof., doktor tekhn.  
nauk, retsenzent

[Short handbook on shaft deepening] Kratkii spravochnik po  
uglubke stvolev shakht. Moskva, Nedra, 1965. 175 p.  
(MIRA 18:8)

SOTSKIY, B. A.: Master Phys-Math Sci (diss) -- "The molecular theory of the complete reflection of light". Minsk, 1958. 12 pp (Beloruss State U im V. I. Lenin) (KL, No 5, 1959, 143)



AUTHORS: Sotskiy, B.A., and Fedorov, F.I.

51-4 -3-13/30

TITLE: Molecular Theory of Reflection and Refraction of Light.  
I. Light Incident from Vacuum onto an Isotropic Medium.  
(K molekulyarnoy teorii otrazheniya i prelomleniya  
sveta. I. Padeniye sveta iz vakuuma na izotropnyuyu  
sredu.)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol.IV, Nr.3,  
pp. 365-372 (USSR).

ABSTRACT: Molecular theory of propagation and refraction of light  
in isotropic media was developed by Ewald, Esmarch,  
Oseen, Lundblad and others (Refs.1-18). This theory  
is based on the following assumptions. Under the  
action of an electromagnetic wave, incident from vacuum  
onto the medium, molecular dipoles are excited into a  
state of degenerate vibrations and emit secondary waves.  
Both the incident and secondary waves obey Maxwell's  
equations for vacuum. Superposition of all the  
secondary waves and of the incident wave gives the  
refracted wave inside the medium, and the reflected  
wave outside it. This molecular theory has a number  
of faults of fundamental nature. Thus Fresnel's

Card 1/3

51-4-3-13/30  
Molecular Theory of Reflection and Refraction of Light. 1.

formulae for the general case of oblique incidence are obtained only in approximate form by using the method of Oseen and Lundblad (Ref.10-12). In none of the papers on the molecular theory of reflection and refraction is the case of total reflection of light dealt with. The present paper is an attempt to develop a more complete and exact molecular theory of reflection and refraction, including in particular the case of total reflection. All the main relationships (such as the relationship between the refractive index and polarizability, the quenching theory of Oseen, Fresnel's formulae) are obtained exactly and in a comparatively simple way. The present authors also generalize Oseen's theory to the case of non-homogeneous waves. The paper is entirely theoretical. There are 2 figures and 21 references, of which 14 are German, 4 Soviet, 2 English and 1 a translation of Born's "Optics" into Russian.

ASSOCIATION: Belorussian State University (Belorusskiy  
Card 2/3 gosudarstvennyy universitet.)

51. 4 -3-13/30  
Molecular Theory of Reflection and Refraction of Light. I.

SUBMITTED: May 4, 1957.

1. Light--Reflection--Theory
2. Light--Refraction--Theory
3. Light--Propagation--Theory

Card 3/3

SOV/51-5-1-10/19

AUTHORS: Sotskiy, B.A. and Fedorov, F.I.

TITLE: On the Molecular Theory of Reflection and Refraction of Light.  
(K molekulyarnoy teorii otrazheniya i prelomleniya sveta)  
II. Light Incident on the Boundary Between an Isotropic Medium  
and Vacuum or Another Isotropic Medium. Total Reflection.  
(II. Padeniye sveta na granitsu izotropnoy sredy s vakuumom ili  
s drugoy izotropnoy sredoy. Polnoye otrazheniye)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 1, pp 57-65 (USSR)

ABSTRACT: In the preceding part of this work (Ref 1) the authors considered  
the case of an infinite plane monochromatic electromagnetic wave  
incident from vacuum on to an isotropic medium. The present paper  
gives the molecular theory of reflection and refraction of light  
at the boundary of two media, of which the first consists of  
molecular dipoles and the second is vacuum or consists of dipoles  
of another type. The molecular theory of total reflection is given.  
It is found that, under certain conditions, the vacuum wave which

Card 1/2

SOV/51-5-1-10/19  
On the Molecular Theory of Reflection and Refraction of Light. II. Light  
Incident on the Boundary Between an Isotropic Medium and Vacuum or Another  
Isotropic Medium. Total Reflection.

appears as the result of superposition of primary waves produced by  
vibrations of dipoles, may be damped in spite of the fact that the  
dipole vibrations are undamped. This is the converse of the case  
discussed in Part I (Ref 1) where a damped dipole wave produced an  
undamped vacuum wave. There are 3 figures and 5 references, 2 of  
which are Soviet, 1 translation of a Western work into Russian,  
1 German and 1 English.

ASSOCIATION: Belorusskiy gosudarstvennyy universitet ( Belorussian State  
University)

SUBMITTED: August 15, 1957

Card 2/2      1. Light - Reflection    2. Light - Refraction    3. Light -  
Molecular theory

SOTSKIY, B.A.

Molecular theory of the refraction of light in crystals.  
Opt. i spektr. 11 no.2:229-236 Ag '61. (MIRA 14:8)  
(Molecular theory)  
(Crystal optics)

GONCHARENKO, A.M.; SOTSKIY, B.A.

Condition of self-excitation in a plane-parallel layer. Dokl.  
AN BSSR 6 no.4:223-225 Ap '62. (MIRA 15:4)

1. Institut fiziki AN BSSR. Predstavleno akademikom AN BSSR  
B.I.Stepanovym.

(Optics, Physical)

9.3700

S/250/62/006/005/003/007  
1024/1224

AUTHORS: Sotskiy, B. A. and Goncharenko, A. M.

TITLE: Electromagnetic field of a plane-parralel layer in conditions of self-excitation

PERIODICAL: Akademiya nauk Belaruskay SSR. Doklady, v. 6, no. 5, 1962, 297-300

TEXT: This paper is a continuation of: A. M. Goncharenko and B. A. Sotskiy, DAN BSSR, 6, no 4, 1962. A system of equations is written for the normal and parellel components of electromagnetic fields, propagating inside and outside an active plane-parallel layer. These equations contain the refraction angle and dielectric constants. Expressions are given for the electric and magnetic fields inside the layer and also for the time and phase averaged energy density and Poynting vector. For the last two a definite dependence of the dielectric constant on the radiation density is assumed. An agreement is claimed between numerical values characterizing the system of rings actually observed on a screen (T. H. Maiman and others, Phys. Rev 123. 1151, 1961) and those predicted by the present paper. There is one figure.

ASSOCIATION: Institute fiziki AN BSSR (Institute of Physics AS BSSR)

SUBMITTED: March 14, 1962

Card 1/1



KHAPALYUK, A.P.; STEPANOV, B.I.; SOTSKIY, B.A.

Electromagnetic field in a plane-parallel layer under self-excitation. Opt.i spektr. 13 no.2:282-285 Ag '62. (MIRA 15:11)

(Optics, Physical)

GONCHARENKO, A.M.; SOTSKIY, B.A.; FEDOROV, F.I.

Self-excitation of a plane-parallel anisotropic layer. Kristallo-  
grafiia 8 no.1:47-50 Ja-F'63 (MIRA 17:7)

1. Institut fiziki AN Belorusskoy SSR.

SOTSKIY, B.A.  
AID Nr. 993-3 19 June

SELF-EXCITATION CONDITIONS FOR A PLANE-PARALLEL CRYSTAL-  
LINE PLATE (USSR)

Sotskiy, B. A., and A. M. Goncharenko. Kristallografiya, v. 8, no. 2,  
Mar-Apr 1963, 273-280. S/070/63/008/002/012/017

The dynamic equilibrium of monochromatic plane waves inside and outside a plane-parallel anisotropic plate bounded by an opaque metallic layer on one surface and a semitransparent layer on the other is considered in the absence of external incident radiation. Such equilibrium can be established only in plates with a negative absorption coefficient. For the general case, eight waves described by eight equations, each having its own absorption

Card 1/2

AID No. 993-3 19 June

SELF-EXCITATION CONDITIONS (Cont.) S/070/63/008/002/012/017

factor and refractive index, must be considered. However, in this specific case the problem is reduced to two independent sets of four equations each describing the generation of ordinary and extraordinary waves in a plate cut from a monaxial crystal of mean syngony perpendicular to the optical axis. Each set of equations is considered separately, and oscillation conditions are derived by setting the determinant of each set equal to zero. Conditions for the existence of non-zero solutions yield the oscillation conditions of extraordinary waves. It is noted that emission in different directions within the plate must be polarized differently. [BB]

Card 2/2

L 9879-63

EWI(1)/BDS/EEC(b) -2--AFFTC/ASD/

ESD-3/SSD--GG/IJP(C)

S/0070/63/008/003/0471/0473

ACCESSION NR: AP3000788

AUTHOR: Petrov, N. S.; Goncharenko, A. M.; Sotskiy, B. A.

TITLE: Oscillation of a plane parallel anisotropic layer in the presence of total reflection

SOURCE: Kristallografiya, v. 8, no. 3, 1963, 471-473

TOPIC TAGS: oscillation, plane parallel layer, anisotropic medium, negative coefficient of absorption

ABSTRACT: Oscillation in a plane parallel anisotropic layer in which electromagnetic waves are propagated obliquely to the layer's surfaces is analyzed within the framework of linear optics. Two cases are considered: 1) oscillation in the presence of total reflection, rather than oscillation in a layer with metal coatings on both sides, and 2) oscillation with total reflection taking place at a single interface only. It is shown that in the former case a stable oscillation regime cannot be attained for either the ordinary or the extraordinary waves without resorting to high energy densities.

Card 1/2

L 9879-63

ACCESSION NR: AP3000788

and nonlinear theory. However, in the latter case oscillation of both ordinary and extraordinary waves can be attained within the framework of linear optics by changing the Fresnel coefficient of absorption at one of the boundaries. Orig. art. has: 15 formulas.

ASSOCIATION: Institut fiziki AN BSSR (Institute of Physics AN BSSR)

SUBMITTED: 08Oct62      DATE ACQ: 21Jun63      ENCL: 00

SUB CODE: 00      NO REF SOV: 003      OTHER: 000

Card

2/2

S/051/63/014/001/018/031  
E032/E514

AUTHOR: Sotskiy, B.A.

TITLE: Oseen's extinction theorem for metals and optically-active isotropic media

PERIODICAL: Optika i spektroskopiya, v.14, no.1, 1963, 112-116

TEXT: The propagation of electromagnetic waves in the free-electron gas in a metal is considered assuming that 1) each electron executes a simple harmonic oscillation under the action of the field, 2) the waves are transverse, and 3) the Oseen theorem holds for the system (Ann. Phys., 48, 7, 1915). Subject to these assumptions it is shown that by considering the interaction of the electromagnetic wave with the free-electron gas, it is possible to obtain the usual Fresnel reflection formulae for a metal. The analysis holds for wavelengths in excess of 1 cm and in the region of the normal skin effect. The analysis is then applied to the case of an optically-active isotropic medium in a vacuum and expressions are derived for the refracted and reflected waves. The results are identical with the usual phenomenological expressions, i.e. macroscopic solutions of  
Card 1/2

Oseen's extinction theorem ...

S/051/63/014/001/018/031  
E032/E514

Maxwell's equations, so that the present analysis in effect provides a molecular foundation for these results. The Oseen extinction theorem is thus found to have a very wide range of applicability and it is concluded that it may be regarded as the fundamental and universal result determining the behaviour of an electromagnetic wave at the boundary between two arbitrary media. ✓

SUBMITTED: November 4, 1961

Card 2/2



45079

S/051/63/014/001/019/031  
E032/E514

24 3200

AUTHORS: Bokut', B.V. and Sotskiy, B.A.  
TITLE: Transmission of light through an optically active absorbing plate  
PERIODICAL: Optika i spektroskopiya, y.14, no.1, 1963, 117-120  
TEXT: The radiation is assumed to be at normal incidence on a plane-parallel optically-isotropic active absorbing plate of thickness  $d$  placed in an isotropic medium with a refractive index  $n$ . The reflections from both surfaces are taken into account. It is shown that the reflected and transmitted fields are in general elliptically polarized. If the incident wave is circularly polarized, then double refraction will be absent and all the waves will have the same polarization as the incident wave. If the incident wave is plane polarized, then the transmitted wave will also be linearly polarized but its plane of polarization will be rotated through an angle  $\chi = 1/2 k^2 d \alpha$ , where  $k$  is the wave number in vacuum and  $\alpha$  is the optical activity coefficient,  $d = \frac{1}{k}$ . The reflected wave will be elliptically polarized with the ratio of the semi-axes given by  
Card 1/2

Transmission of light through ...

S/051/63/014/001/019/031  
E032/E514

$$\frac{b}{a} = \frac{np \left( n_o'^2 - n^2 - \kappa^2 \right)}{\left| n_o'^2 - n^2 \right|^2}$$

where  $n_o'$  and  $\kappa$  are the refractive index and absorption coefficient of the plate, respectively, and  $p = \kappa a$ . These results are obtained by solving Maxwell's equations subject to the appropriate boundary conditions. The paper concludes with a molecular interpretation of these results in terms of the C. W. Oseen theorem (Ann. Phys., 48, 7, 1915). The molecular treatment yields the same results as the "macroscopic solution" of the Maxwell equations.

SUBMITTED: November 30, 1961

Card 2/2

STEPANOV, B.I.; GONCHARENKO, A.M.; IVANOV, A.P.; SAMSON, A.M.;  
SOTSKIY, B.A.; KHAPALYUK, A.P.

Generation of radiation from an infinite plane-parallel layer.  
Izv.AN SSSR.Ser.fiz. 27 no.4:460-465 Ap '63. (MIRA 16:4)  
(Masers) (Electric resonators)

ACCESSION NR: AP4044254

S/0250/64/008/007/0438/0440

AUTHOR: Sotskiy, B. A.; Goncharenko, A. M.

TITLE: Diffraction of partially coherent light

SOURCE: AN BSSR. Doklady\*, v. 8, no. 7, 1964, 438-440

TOPIC TAGS: physical optics, dielectric resonator, light diffraction, partially coherent light

ABSTRACT: An attempt has previously been made to calculate the diffraction of partially coherent light at a narrow slit, given an exponentially decreasing coherence function. Since the implicit assumption that the latter satisfies the wave equation is not satisfied, the results obtained are doubtful. In the present paper, the calculation is made for a coherence function of the form  $(\sin \frac{x}{\alpha})/\frac{x}{\alpha}$  where  $\alpha$  is the coherence interval. The diffracted intensity found does not differ greatly from that for monochromatic light when  $2a/\alpha$  is small, where  $2a$  is the width of the slit. When this ratio is large, the divergence of the radiation is  $\lambda/2\alpha$ , independent of the slit width, as confirmed by experiment. For dielectric resonators this angle will be several tens of minutes. It is not known how well the coherence function fits the case of a dielectric resonator; however, it satisfies the wave equation, decreases with increasing distance between the points con-

Card

ACCESSION NR: AP4044254

sidered and probably does not give results differing greatly from those given by other functions satisfying these criteria. "The author acknowledges the interest of Prof. B. I. Stepanov and B. B. Boyko in his work." Orig. art. has: 1 figure and 9 formulas.

ASSOCIATION: Institut fiziki AN BSSR (Physics Institute, AN BSSR)

SUBMITTED: 28Feb64

ENCL.: 00

SUB CODE: OP

NO REF SOV: 001

OTHER: 006

Card

2/2

L 23062-65 EWG(j)/EWA(k)/FBD/EWG(r)/EWT(l)/EEG(k)-2/EEG(t)/T/EEG(b)-2/EWP(k)/  
EWA(m)-2/EWA(h) Pf-l/P1-l/P1-l/Pn-l/Pn-l/Po-l/Pe<sup>b</sup> IJP(c) WD

ACCESSION NR: AP5003373

S/0250/64/000/012/0784/078

AUTHOR: Goncharenko, A. M.; Sotskiy, B. A.

TITLE: Oscillation of a cylinder with a circular cross section and a sphere

SOURCE: AN BSSR. Doklady, v. 8, no. 12, 1964, 784-787

TOPIC TAGS: oscillation, generation, laser<sup>25</sup>, laser action, oscillation mode, oscillation condition

ABSTRACT: A theoretical analysis is conducted of stimulated emission of a cylinder with a circular cross section and a sphere. Since this problem is actually equivalent to finding modes for given cavity resonators, the authors use general solutions of Maxwell's equations for the cylinder and the sphere. Under the assumption that the radius of the cylinder and the sphere are finite, asymptotic Bessel and Hankel functions are used in the solutions. The two cases considered are those for which the mode number is low and the mode numbers are of the order of the absolute value of the wave number times the radius of the

Card 1/2

L 23062-65

ACCESSION NR: AP5003373

sphere or the cylinder. It is shown that the Q-factor is higher for higher modes. Therefore, for the given geometry stimulated emission of higher modes should be observed. In case of higher mode emission the index of refraction of the active medium is greater than that of the surrounding medium. Therefore, both in the case of the sphere and the cylinder an effect analogous to the scattering of waves near the critical angle takes place and the energy is radiated primarily in the direction tangential to the surface. This effect causes additional energy losses and a decrease of the Q-factor. It is pointed out that such losses are absent in gaseous lasers and also in the presence of a dielectric along the sides of the cylinder with an index of refraction higher than that of the active medium. Orig. art. has: 17 formulas. [CS]

ASSOCIATION: Institut fiziki AN BSSR (Institute of Physics, AN BSSR)

SUBMITTED: 18Sep63

ENCL: 00

SUB CODE: EC,ME

NO REF SOV: 003

OTHER: 003

ATD PRESS: 3173

Card 2/2

ACCESSION NR: AP4020966

S/0051/64/016/003/0513/0516

AUTHOR: Petrov, N. S.; Goncharenko, A. M.; Sotskiy, B. A.

TITLE: Concerning self-excitation in a plane-parallel slab in the presence of total reflection

SOURCE: Optika i spektroskopiya, v. 16, no. 3, 1964, 513-516

TOPIC TAGS: laser, laser oscillation, stimulated generation, self-excitation, laser slab, plane-parallel slab, reflection, laser slab reflection

ABSTRACT: Under the usual conditions of generation (laser oscillation) in a plane-parallel slab, energy is emitted through one or both faces (given a sufficient thickness of the metallic coating on the other); that is, under conditions in which part of the energy is lost due to absorption. This can be avoided by providing for complete reflection by bevelling at least one of the end faces to the angle of total reflection. Thus, the stimulated emission from a spherical specimen observed by C. B. Garret, W. Kaiser, and W. L. Bond (Phys.Rev., 124, 1807, 1961) may be explained by increase of the reflection coefficient at near total reflection angles. Accordingly, the present paper analyses the possibility of generation (self-excitation)

Card

1/12



ACCESSION NR: AP4020966

of electromagnetic waves in a plane-parallel slab under conditions of total reflection. The approach is solution of the Maxwell equations with the appropriate boundary conditions; an analogous problem was solved earlier by two of the authors (A. M. Goncharenko and B. A. Sotskiy, DAN BSSR, 6, 223, 297, 1962), and the expressions for the condition necessary for self-excitation are taken from those papers. By separation of the real and imaginary parts and introduction of the Fresnel reflection coefficients, the conditions for self-excitation in a plane-parallel slab are derived in the case of total reflection from both faces. Analysis of the expressions shows that self-excitation is impossible if the imaginary component of the dielectric constant (i.e., the negative absorption) is smaller than zero, that is, in the region of linear optics; however, the energy density in the layer may build up to the point where in the limit the medium becomes transparent and self-excitation becomes possible (but, of course, no radiation can be extracted without violating the condition for total reflection). The equations are also extended to the case of a slab with total reflection only at one face; in this case self-excitation (laser oscillation) becomes possible in the region of linear optics. The condition for generation is affected primarily by the value of the ordinary Fresnel reflection coefficient. "The authors are grateful to F. I. Fedorov and B. V. Bokut' for their interest in the work." Orig. art. has: 21 formulas and 2 figures.

Card

2/3

ACCESSION NR: AP4010757

S/0020/64/154/001/0091/0093

AUTHORS: Sotskiy, B. A.; Goncharenko, A. M.

TITLE: On the condition of electromagnetic waves generation in a double-layer crystal

SOURCE: AN SSSR. Doklady\*, v. 154, no. 1, 1964, 91-93

TOPIC TAGS: photon generator, electromagnetic wave, crystal, uniaxial crystal, crystal self-excitation, laser, double-layer crystal

ABSTRACT: The previous work of the authors (Kristallografiya 8, 47 1963) which dealt with an ideal homogeneous crystal layer is extended to a parallel plane crystalline plate consisting of two layers of equal thickness of uniaxial crystals with an arbitrarily oriented optical axis. This represents the simplest model of an actual crystal which has a nonuniformity of the refractive index and of the absorption coefficient. For the derivation of the conditions for generation (self-excitation), in the absence of external radiation, the Maxwell equations are solved with the boundary conditions at the three separation planes. The results show that the

Card 1/2

ACCESSION NR: AP4010757

conditions of generation in a double layer are considerably more complex than those in a uniform layer. Small deviations from uniformity have very little effect on the generation of the ordinary wave. The extraordinary wave is affected more.

"The authors are grateful to Prof. F. I. Fedorov for a useful discussion of the results."

Orig. art. has: 1 Figure and 12 Equations.

ASSOCIATION: Institut fiziki Akademii nauk SSSR ( Physical Institute, Academy of Sciences, SSSR)

SUBMITTED: 01Apr63

DATE ACQ: 10Feb64

ENCL: 00

SUB CODE: PH

NR REF SOV: 003

OTHER: 002

Cord 2/2

L 45567-65 EWA(k)/FBD/EWG(r)/EWT(l)/EPA(s)-2/EEC(k)-2/EEC(t)/T/EEC(b)-2/EWP(k)/  
EWA(m)-2/EWA(h) Pm-4/Pn-4/Po-4/Pf-4/Pt-7/Peb/Pi-4/Pl-4 SCTB/IJP(c) WG/GG

ACCESSION NR: AP5011081

UR/0250/65/009/004/0224/0227

AUTHOR: Goncharenko, A. M.; Sotskiy, B. A.

TITLE: Contribution to the theory of a dielectric round cavity. I.

SOURCE: AN BSSR. Doklady, v. 9, no. 4, 1965, 224-227

TOPIC TAGS: laser cavity, dielectric cavity, fiber cavity, surface loss, resonator loss

ABSTRACT: The authors point out first that neglect of reflection from the side walls of laser cavities is not justified in practice, especially since the observed distribution of radiation intensity in dielectric rods is similar to the distribution obtained in optical fiber cavities, the theory of which has been fairly well developed. They therefore extend the results obtained for fibers to derive some information on the properties of finite dielectric circular cavities without solving the boundary value problem. It is shown that, as in an infinite cylinder, the field inside a finite cylinder can be expressed in terms of a superposition of cylindrical waves traveling in both directions along the cylinder axis. Although the external field can be determined only for an infinite cylinder,

Card 1/2

L 45567-65

ACCESSION NR: AP5011081

continuity conditions make it possible to estimate the energy of the individual proper modes and the losses through the side surface or through the end surfaces of such a cavity, as well as some other properties. Approximate expressions for the energy flux through the side surface are obtained in the case of low losses. An analysis of the mathematical results will be presented in a separate paper. This report was presented by B. I. Stepanov. Orig. art. has: 13 formulas. [02]

ASSOCIATION: Institut fiziki AN BSSR (INSTITUTE OF PHYSICS, AN BSSR)

SUBMITTED: 04Apr64

ENCL: 00

SUB CODE: EC, EM

NO REF SOV: 003

OTHER: 005

ADD PRESS: 4001

*and*  
Card 2/2

L 1983-66 EWT(1)/EWA(h)

ACCESSION NR: AP5017693

UR/0250/65/009/006/0360/0363

AUTHORS: Goncharenko, A. M.; Sotskiy, B. A.

TITLE: Contribution to the theory of a dielectric circular resonator.  
II

SOURCE: AN BSSR. Doklady, v. 9, no. 6, 1965, 360-363

TOPIC TAGS: resonator, dielectric material, laser optics, laser pumping

ABSTRACT: This is a continuation of an earlier paper (DAN BSSR v. 9, no. 4, 1964), in which general formulas were derived for the energy of a finite resonator and for the energy losses. The present paper deals in greater detail with the properties of dielectric circular resonators in the case when the critical resonance condition can be satisfied for cylinders of finite length, and when the losses through the resonator ends are replenished (negative absorption or amplification). It is shown that with increasing radial propagation constant the total energy and the energy flux through the resonator ends de-

Card 1/2

L 1983-66

ACCESSION NR: AP5017693

crease rapidly, so that nonaxial modes begin to predominate. This explains, in particular, the occurrence of divergence in laser beams. It is deduced from the analysis that at minimum pump energy (threshold) only lower axial modes should appear, and that an increase in the pump energy is accompanied by the appearance of nonaxial modes, which must be suppressed to limit the beam divergence. 'The authors thank Professor B. I. Stepanov' for a discussion of the results.' This report was presented by B. I. Stepanov. Orig. art. has: 6 formulas.

ASSOCIATION: Institut fiziki AN BSSR (Physics Institute, AN BSSR) 4/

SUBMITTED: 05Jun64

ENCL: 00

SUB CODE: QP, QP

NR REF SOV: 003

OTHER: 005

Card 2/2

SP



L 61897-65 EWT(d)/EWT(1)/T/EEG(b)-2 Pq-4/Pi-4 IJP(c)

ACCESSION NR: AP5017906

UR/0051/65/019/001/0138/0140  
535.42.001.1

AUTHOR: Sotskiy, B. A.

TITLE: On the possibility of determining the coherence function from observations of diffraction

SOURCE: Optika i spektroskopiya, v. 19, no. 1, 1965, 138-140

TOPIC TAGS: coherence function, optical diffraction, diffraction pattern, coherence, diffraction

ABSTRACT: In view of the great difficulties entailed in an experimental determination of the coherence function, the author proposes to determine this function from the diffraction pattern. To this end it is necessary only to measure photometrically the intensity distribution in the focal plane of a lens placed behind the slit. The validity of this approach is demonstrated by an analysis of the formula for the intensity of light having a specified coherence function and diffracted by a slit, which is a Fredholm integral equation of the first kind relative to the coherence function. An analytic solution for the coherence function, obtained from the integral equation, is presented, and it is shown that to determine the coherence function it is sufficient to measure the values of the light intensity in a discrete set of equidistant points. "The author thanks B. I. Stepanov, B. B. Boyko, A. M. Goncharenko, and A. P. Khapalyuk for a useful discussion. Orig. art. has: 9 formulas.

Curd 1/2

I 61897-65

ACCESSION NR: AP5017906

ASSOCIATION: none

SUBMITTED: 21Dec64

NO REF SOV: 002

ENCL: 00

OTHER: 003

SUB CODE: OP

ATD PRESS: 4059

*dm*  
Card 2/2

L 8106-66 EWA(k)/FBD/EWT(1)/EEC(k)-2/T/EWP(k)/EWA(m)-2/EWA(h) SCTB/LJP(c) WC  
 ACCESSION NR: AP5027672

AUTHOR: Sotskiy, B. A.<sup>44</sup>; Goncharenko, A. M.<sup>44</sup>  
 UR/0051/65/019/005/0788/0791  
 621.375.9:535.001.1

TITLE: Connection between the coherence of radiation and the number of modes in a quantum generator

SOURCE: Optika i spektroskopiya, v. 19, no. 5, 1965, 788-791

TOPIC TAGS: quantum generator, <sup>25,44</sup>laser theory, LASER RADIATION

ABSTRACT: On the basis of the classical theory of coherence (M. Born and E. Wolf, "Principles of Optics", NY, 1959), the degree of coherence of radiation in a quantum generator is evaluated, and its connection with the number of generated modes is determined. It is assumed that the radiation field of the quantum generator consists of N planar harmonic modes having different frequencies and directions of propagation but identical (unit) amplitudes; also the electromagnetic field is considered in a scalar approximation. It is found that under stationary conditions the radiation is entirely coherent when only one mode is generated. Both spatial and time coherences rapidly deteriorate as the number of generated modes increases. Under nonstationary conditions, the radiation field of a laser is partially coherent, the degree of coherence again depending on N. "The authors wish to thank

Card 1/2